

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants : Kenichi WAKUI et al
Serial No. : 10/532,097
Filed : November 9, 2005
For : PROCESS FOR PRODUCING OLEFIN BY CATALYTIC CRACKING OF HYDROCARBON
Art Unit & Examiner : 1797; In Suk Bullock

DECLARATION UNDER 37 CFR 1.132

Honorable Commissioner of Patents and Trademarks,
Washington, D.C. 20231

Sir:

I, Kenichi WAKUI, 1-1, Anesakikaigan, Ichihara-shi, Chiba, Japan, declare that:

1. I am an employee of IDEMITSU KOSAN CO., LTD. being engaged in the research and development works for the production of catalyst and the related product in the Company;
2. I am familiar with the subject matters in the above-identified patent application;
3. I have a good knowledge of the English Language and have read and understood the application papers and the Examiner's Official Action as well as the references cited therein in the prosecution of above-identified patent application;

4. The purpose of experiments

The feature of the present invention lies in the use of penta-sil zeolite comprising rare earth elements and at least one of manganese and zirconium as a catalyst in the catalytic cracking of hydrocarbon material, which provides the superior effect that Material conversion ratio is high.

In the present invention, Ce or Mixture of rare earth elements provides the same superior effect as La.

In order to clarify the above fact, the following experiments were carried out.

5. Experimental method.

Experiment A

The catalytic cracking reactions of n-butane were carried out in the same manner as in Example 7 of the present Specification, except that Ce-Zr/HSZM-5 was used as catalyst in Experiment A.

Experiment B

The catalytic cracking reactions of n-butane were carried out in the same manner as in Example 7 of the present Specification, except that RE-Zr/HSZM-5 was used as catalyst in Experiment B, wherein RE is a mixture (as oxide) of La_2O_3 , CeO_2 , Pr_6O_{11} , Nd_2O_3 , Sm_2O_3 and Eu_2O_3 (85.5 wt%, 13.8 wt%, 0.4 wt%, 0.1 wt%, 0.1 wt% and 0.1 wt%, respectively).

6. Experimental Results

The experimental results are summarized in Table A, wherein the results are described in comparison with Example 7 in the same manner as in Table 3 of the present Specification.

Table A

	Experiment A		Experiment B		Example 7	
Catalyst	Ce-Zr/HSZM-5		RE-Zr/HSZM-5		La-Zr/HSZM-5	
Reactant	n-butane		n-butane		n-butane	
Temperature (°C)	650		650		650	
Passing Time (hrs.)	2	50	2	50	2	50
Material Conversion ratio (%)	97.5	92.0	96.2	93.0	96.3	92.7
Y Wt %	Ethylene	34.1	31.6	35.2	32.2	34.8
	Propylene	20.3	19.1	20.5	19.8	21.4
	BUTANES	3.9	5.6	3.3	5.5	2.6
	Aromatics	6.2	4.1	5.2	4.1	2.8
	Methane	12.7	11.2	14.0	13.3	13.7
	Ethane	14.0	13.4	13.2	12.5	13.9
	Propane	1.9	1.7	1.1	1.0	1.2
	Isobutane	1.3	1.0	0.8	0.6	0.3
	C ₅₊ Coke	2.1	3.4	2.1	3.1	2.8
	CO	1.4	1.3	1.0	1.0	1.2
	CO ₂	0.2	0.4	0.1	0.1	0.3

7. Conclusion

In the present invention, Ce or Mixture of rare earth elements provides the same superior effect as La.

I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Kenichi Wakui
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Date: October 17 . 2008